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A Guide to the Preparation of Net Drawings

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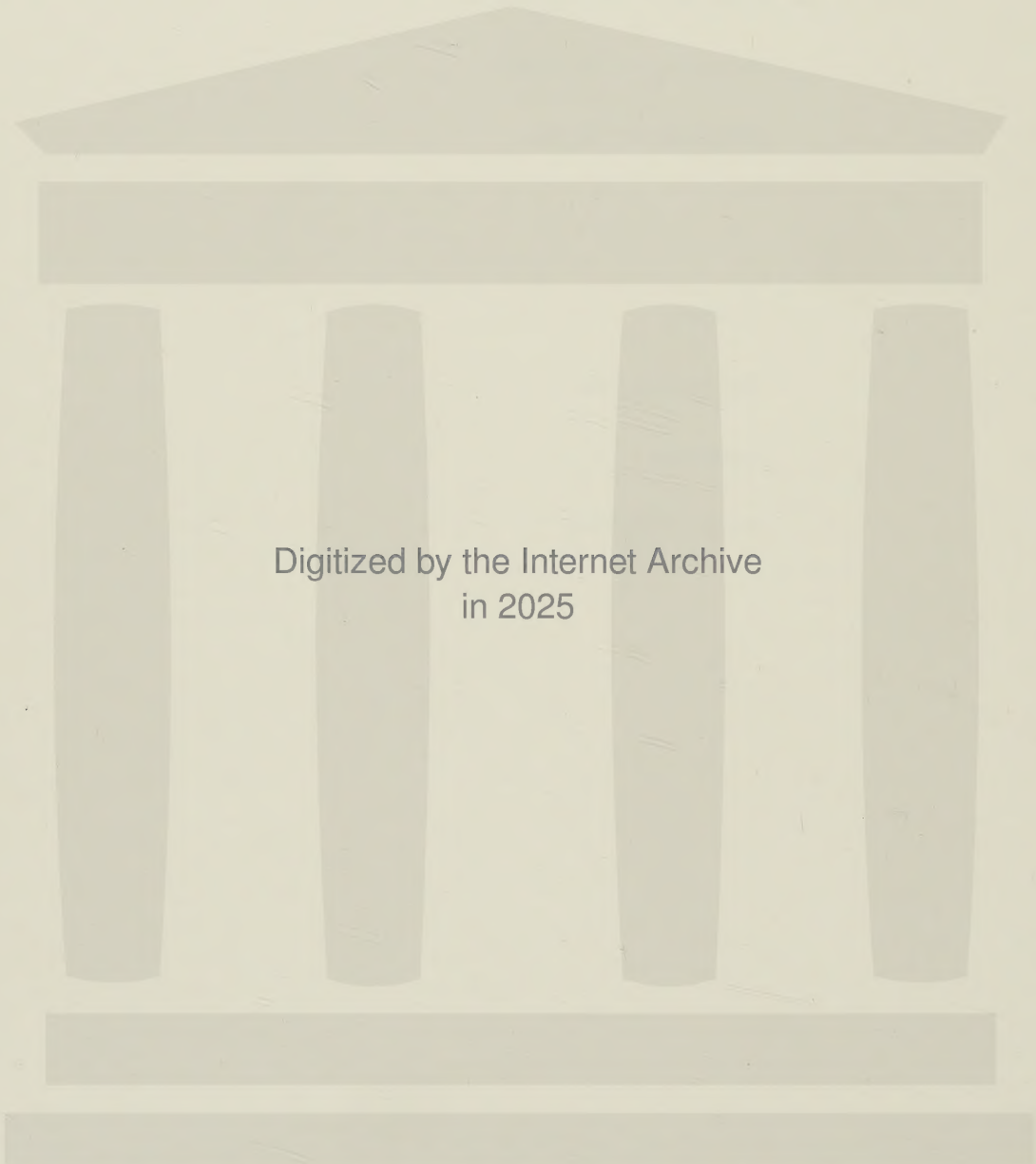
CONTENTS

	Page
Introduction	1
The Design Data and Calculations required	1
Style of Presentation	9
Detailing for Net Drawings	10
Preparation for the Drawing	12
Executing the Drawing	12
Summary	17
Acknowledgments	17
References	17
Previous Pamphlet	18



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A Guide to the Preparation of Net Drawings

E S Strange

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Introduction

For various types of engineering and construction drawings there are recognised standards governing style of presentation and conventions for detailing them. Whereas there are British and International standards for some aspects of the design and construction of fishing nets and the materials the nets are made of, there is as yet no standard for net drawings. Proposals for such a standard, however, are currently under consideration by the British Standards Institution and International Standards Organisation. Many of these proposals are in line with the conventions adopted by the Food and Agriculture Organisation, Rome, in their catalogues of fishing gear (FAO, 1965, 1972, 1975) and by the Marine Laboratory at Aberdeen. It is likely that a British Standard for net drawings will differ only in detail from those adopted by these two organisations.

The purpose of this pamphlet is to describe the style and conventions adopted by gear technologists at the Marine Laboratory for net drawings and the way in which they are prepared, thus providing a basis for net drawing practice in anticipation of the British Standard. For the benefit of new students of gear technology and net construction the pamphlet describes the design data from which the net draughtsman works and the calculations that he may need to perform before executing the drawing. It is assumed that the reader is familiar with the names of the principal types of fishing gear and their components (cf Strange, 1977). Where applicable the terminology used and recommendations presented in the text comply with existing British Standards.

The Design Data and Calculations required

Dimensions

The designer of the net may express dimensions of net sections as numbers of meshes of given size, or stretched lengths or hung lengths. To convert these from one to the other it is necessary to understand the inter-dependence of netting dimensions, mesh size and mesh opening with respect to the directions of the netting.

Directions of Netting

The directions of netting designated N, T and AB (British Standard 4440: 1974) are defined as follows:—

N direction (Normal) is the direction at right angles to the general course of the twine (Fig. 1). When the netting is stretched in this direction the knots tend to tighten;

T direction (Twinewise) is the direction parallel to the general course of the twine. When the netting is stretched in this direction the knots tend to open;

AB directions (Fig. 2) are parallel to a rectilinear sequence of bars (mesh sides).

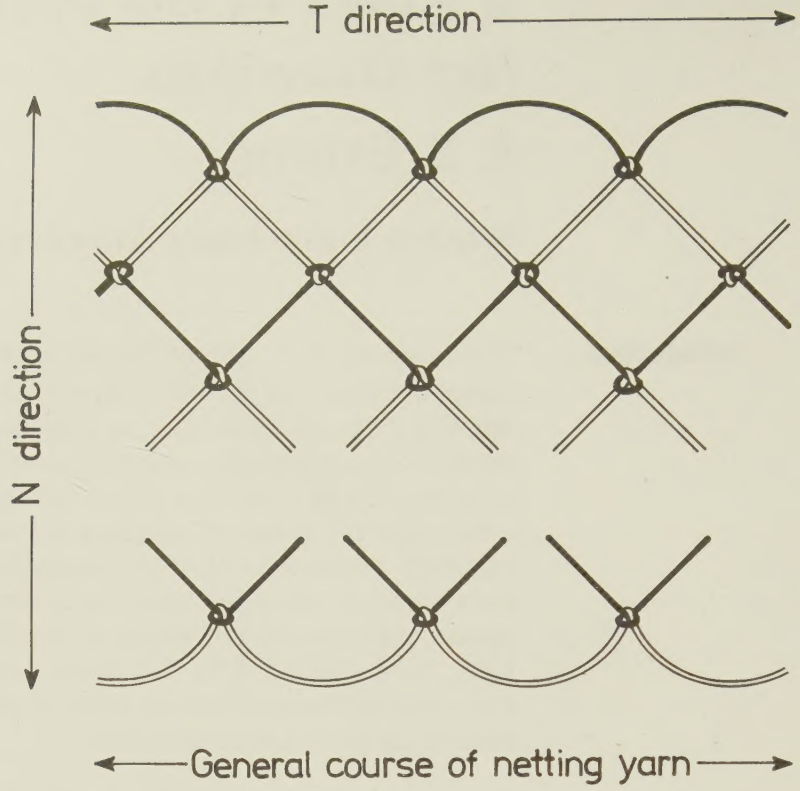


Figure 1. N and T directions of netting.

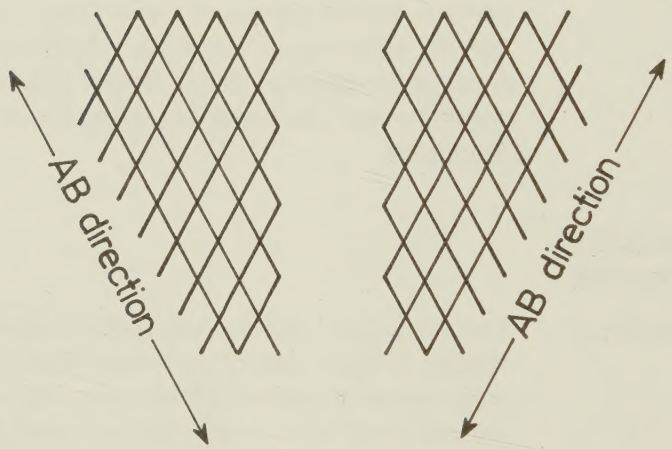


Figure 2. AB directions of netting.

Mesh Size

Mesh size is indicated by its length, defined as the distance between the centres of two opposite knots when the mesh is fully stretched in the N direction (British Standard 4440: 1974).

Stretched Length and Hung Length

If a piece of netting is closely gathered in the T direction and fully stretched in the N direction, the length of the netting in the N direction is equal to the number of meshes in this direction multiplied by the mesh size. This dimension is known as the stretched length.

For the construction of fishing nets the netting panels, which may consist of a single piece of netting or a number of sections joined together, are attached to ropes or a frame along their upper edges if the nets are to be fished vertically or leading edges if they are to be towed. The netting is then said to be

hung. With the meshes spread in the T direction along the frame or rope the length of the netting in the N direction will be shortened by an amount depending on how far the meshes in the T direction are spread. This contracted N length is known as the hung length.

Before calculations can be performed to convert dimensions to numbers of meshes and vice versa, the ratio of the desired opening of the meshes and length of rope to which they are attached, the hanging ratio, must be known.

Hanging Ratio

The hanging ratio is defined as the ratio between the length of the final rope and the fully extended length of the side of the netting to which it is attached prior to being hung (British Standard 4440: 1974) and is expressed:—

$$\text{Hanging ratio} = \frac{\text{length of rope}}{\text{mesh size x number of meshes wide}}$$

The numerator and denominator are both expressed in the same unit of length. This ratio may be given as a fraction or, in the cases of more complex hanging ratios for purse seines and gill nets, as a decimal or percentage. Sometimes this information may be given as the number of meshes per unit length of rope.

Meshes/Length Calculations

Net panels may be attached to the main frame rope in the T or N direction depending on the type of net. For the purpose of identifying the dimensions in the following examples of meshes/length calculations it is convenient to consider a piece of netting hung to a frame rope along its T direction.

Calculation of frame rope length

The required length for the frame rope will be the product of the number of meshes in the T direction, the mesh size and the hanging ratio.

Example 1.

Number of meshes in T direction = 120
Mesh size = 70 mm
Hanging ratio = ½
∴ Length of frame rope = 120 x 70 x ½ mm
= 4.2 m

Calculation of hung length

Figure 3 represents a piece of netting attached to a frame rope.

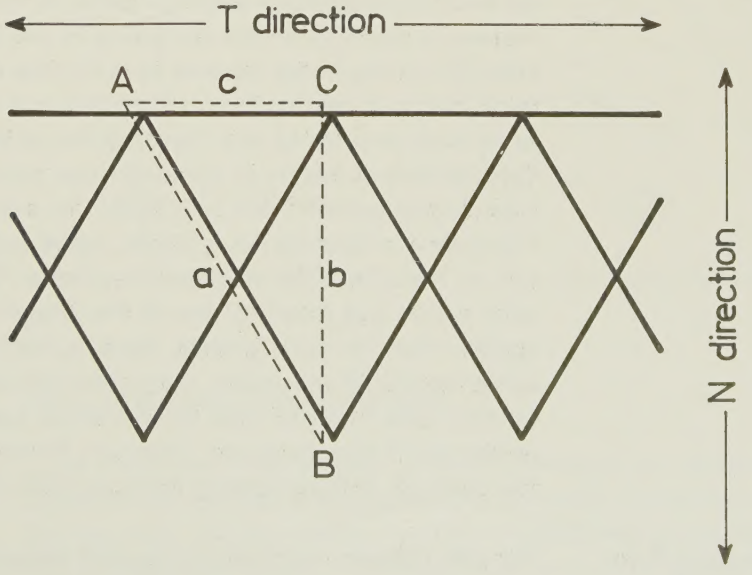


Figure 3. Piece of netting attached to a frame rope (see text).

In the triangle A B C

a = fully stretched length of meshes

b = hung length of meshes

c = aE = spread of meshes

E = hanging ratio

$$\therefore b = \sqrt{a^2 - (aE)^2}$$

$$= \sqrt{a^2 \quad (1-E^2)}$$

$$= a\sqrt{1-E^2}$$

By substituting the product of mesh size and number of meshes long for a, the hung length of the netting may be calculated.

Example 2. A piece of netting 200 meshes along the T direction, 300 meshes along the N direction and mesh size 70 mm, is mounted to a rope with a hanging ratio of $\frac{2}{3}$.

The fully stretched length of the netting = 300 x 0.07 m = 21 m

From the equation $b = a\sqrt{1-E^2}$ the hung length of the netting =

$$= 21 \times \sqrt{1-(2/3)^2}$$

$$= 21 \times \sqrt{\tfrac{5}{9}}$$

= 15.65 m (to nearest cm)

If the mesh size, hanging ratio and final hung dimensions of a piece of netting are known then the number of meshes required in the T direction will equal the length of the rope divided by the product of the hanging ratio and mesh size. The number of meshes in the N direction will be found by solving the equation $b = a\sqrt{1-E^2}$ for a and dividing the result by the mesh size.

If the design of the net calls for the netting to be hung along the N direction then in the above equation a and b refer to dimensions in the T direction and c and E refer to the meshes in the N direction.

Shaping of net sections

Hand made netting is shaped as it is braided and if it is to be tapered this is achieved by creasing or bating meshes in the T direction every nth row of half meshes in the N direction according to the degree of taper required. Machine-braided netting is not tapered as it is made and usually the net maker procures large pieces of netting from which to cut a number of net sections having the same mesh and twine size, tapering the sections to requirements as he does so. Calculations of bating or creasing rates (sequences) and cutting rates (sequences) are different and, since the numerical instructions derived from them are not directly comparable, other calculations are required to convert one to the other. The standard practice at the Marine Laboratory is to work with bating and creasing rates at the design and checking stages and then to convert these to cutting rates, showing both sets of data on the drawing. To avoid confusing the reader, more complex calculations needed to derive cutting rates first and then to convert to bating or creasing rates are not presented in this pamphlet. They are, however, fully explained in the ISO standard for cutting netting to shape (ISO 2075–1972E).

Bating and Creasing Rates Calculations

For calculations involving bating and creasing rates the area of the netting must be divided into trapezium shaped sub-areas with their parallel sides in either the N or T direction, and each sub-area treated separately. For this purpose one of the parallel sides may be one mesh long, and the area then

appears as a triangle when drawn. The relationship of meshes in the T direction at the beginning and end of the tapers and bating and creasing rates can then be expressed by the following equation.

$$M_1 - M_2 = \pm \frac{r}{n_1} \pm \frac{r}{n_2}$$

when M_1 = number of meshes in T direction at the end of the taper

M_2 = number of meshes in T direction at the beginning of the taper

$\pm \frac{r}{n_1}$ = number of meshes gained (+) or lost (−) on the left side

$\pm \frac{r}{n_2}$ = number of meshes gained (+) or lost (−) on the right side

r = rows long (of ½ meshes in the N direction)

n_1 and n_2 = rows per creasing or bating on the left and right respectively.

Example 3.

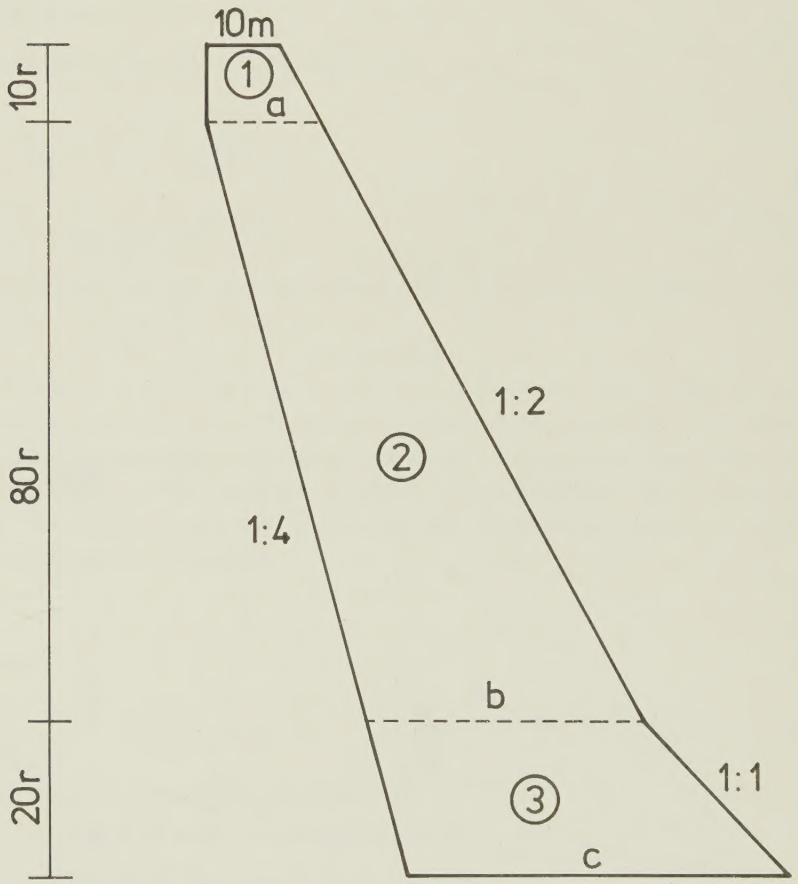


Figure 4. Top wing of a trawl (see text).

Figure 4 shows a top wing of a trawl, 10 meshes across the top, first 10 rows plain on the outside, creasing every 2nd row on the inside, next 80 rows bating every 4th row on the outside, creasing every 2nd row on the inside, last 20 rows bating every 4th row, creasing every row on the inside. The bating and creasing rates are shown against the tapered sides eg 1:4 = 1 mesh in 4 rows.

The number of meshes across a, b and c require to be calculated.

Divide the wing into subsections ①, ②, ③ where the creasing and bating rates change.

From the equation $M_1 - M_2 = \pm \frac{r}{n_1} \pm \frac{r}{n_2}$

for area ① $a - 10 = \frac{10}{2}$ (Left side is straight)

$\therefore \quad a = \frac{10}{2} + 10$

$= \underline{15 \text{ meshes}}$

for area ② from the previous calculation $a = 15$

$b - 15 = -\frac{80}{4} + \frac{80}{2}$

$\therefore \quad b = 15 - 20 + 40$

$= \underline{35 \text{ meshes}}$

for area ③ from the previous calculation $b = 35$

$c - 35 = -\frac{20}{4} + \frac{20}{1}$

$\therefore \quad c = 35 - 5 + 20$

$= \underline{50 \text{ meshes}}$

Example 4.

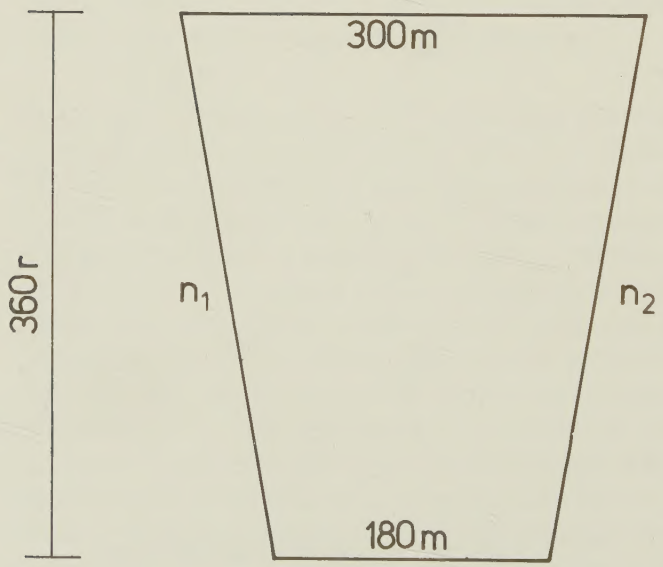


Figure 5. Belly of a trawl (see text).

Figure 5 shows a belly of a trawl 360 rows long, bated each side equally from 300 meshes across the top to 180 meshes across the bottom. The bating rate is required.

$$180 - 300 = -\frac{360}{n_1} - \frac{360}{n_2}$$

Since n_1 and n_2 are equal

$$\frac{180 - 300}{2} = -\frac{360}{n_1} = -\frac{360}{n_2}$$

$$\therefore n_1 = n_2 = \frac{360}{60}$$

$$= 6$$

$\therefore$ 1 bating is required each side every 6 rows, ie the bating rate = 1:6.
If n_1 and n_2 are not exact whole numbers then a bating sequence involving the two nearest batings will be required. In such cases the number of batings required per sequence is equal to the value of the denominator of the fraction, and the number of batings at the slower rate is equal to the value of the numerator.

Example 5.

If in example 4 the value of r is 400 then

$$n_1 = n_2 = \frac{400}{60}$$

$$= 6\ 2/3$$

The two nearest bating rates are 1:6 and 1:7 and the bating sequence is 1:6, 1:7, 1:7.

When the value of n is less than 1, ie a proper fraction, the bating or creasing sequence will involve one or more double batings or creasings. The denominator indicates the number of meshes to be lost or gained per sequence and the numerator indicates the number of rows in the sequence. The difference between the denominator and the numerator equals the number of rows to be bated or creased by 2 meshes.

Example 6.

$$n = \frac{3}{5}$$

$\therefore$ number of meshes to lose = 5
number of rows per sequence = 3
number of rows bated by 2 meshes = 2
and the bating sequence = 2 : 1
2 : 1
1 : 1
5 meshes : 3 rows

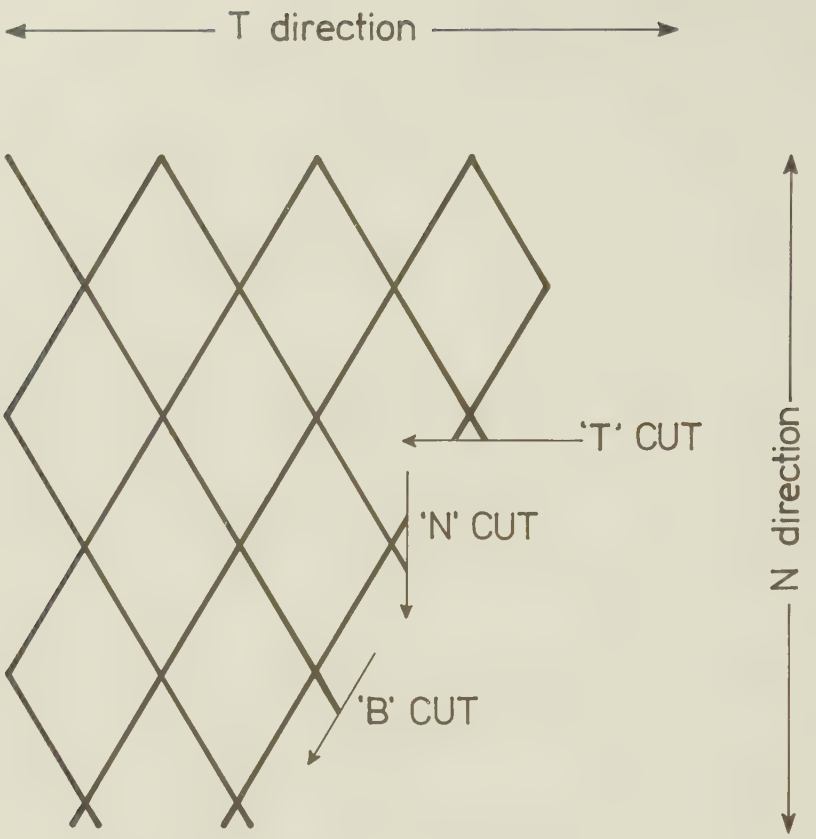


Figure 6. The cuts used for shaping netting.

There are three types of cuts used for cutting netting to shape and these are designated "N cuts", "T cuts" and "B cuts". N and T cuts are made just beyond the waste side of the knots in the N and T directions respectively and B cuts are made parallel to the AB direction (Figure 6.). Taper is achieved by a rhythmical alternation of these cuts and the degree of taper is determined by the length of consecutive sections of N, T and B cuts. The length of N and T cuts is indicated by the number of consecutive meshes cut, and the length of B cuts by the number of consecutive bars severed along the cutting edge not counting the bars on the preceding knot. To describe the cutting rate for tapering netting the number and type of each cut are indicated, giving first the N or T cuts and then the B cuts. If one type of cut only is required it is prefixed with A, eg AB — all bar cuts (British Standard 4763: 1971).

Calculation of Cutting Rates from Bating or Creasing Rates

For cutting rates faster than 1 mesh in 2 rows a combination of T and B cuts is employed. A cutting rate of 1 mesh in 2 rows calls for all B cuts and cutting rates slower than 1 mesh in 2 rows involves a combination of N and B cuts.

T and B Cutting

Half a mesh is lost every time a B cut is made and the cut netting becomes 1 row longer. For every T cut 1 mesh is lost but the cut netting remains the same length.

$$\therefore \text{ number of meshes decrease } = T + \frac{B}{2}$$

$$\text{number of rows } = B$$

and the cutting rate is $T + \frac{B}{2}$ meshes in B rows.

Example 7 for a bating of 3 meshes in 2 rows

$$B = 2;\ T + \frac{B}{2} = 3;\ \therefore\ T = 2$$

and the required cutting sequence is 2T, 2B ie 1T, 1B

N and B cutting

Half a mesh is lost every time a B cut is made and the cut netting becomes 1 row longer. For every N cut, the cut netting becomes 2 rows longer but no meshes are lost.

number of meshes decrease $= \frac{B}{2}$

number of rows = (2N+B)

and the bating rate is $\frac{B}{2}$ meshes in (2N+B) rows.

Example 8 for a bating rate of 1 mesh in 8 rows.

$B = 2;\ (2N+B) = 8\ \therefore\ N = 3$

and the required cutting sequence = 3N. 2B

or (2N. 1B
(
(1N. 1B

Style of Presentation

The general practice for net drawings is to show panels 'hung' vertically, eg towed nets with their wing ends uppermost and other nets with the float line uppermost. The panels are shown separated and side by side corresponding to either a common base line or common top line, as appropriate. For towed nets the top panel is shown to the left of the bottom panel. The sections that constitute each panel are shown joined, ie in the drawing adjacent sides share a common line.

All dimensions are drawn in relation to the N and T direction of the panels, ie the panels are drawn according to horizontal and vertical dimensions. Depending on the type of net and its design the bulk of the netting may be hung in the N or T directions. In the drawing all dimensions relating to the T direction are drawn according to the hanging ratio, ie if the panel is mounted in the T direction, the T dimensions relate to the final length of the rope the panel is attached to, and if the panel is mounted in the N direction the T dimensions relate to the hung depth explained above in the section on hanging ratio. N dimensions are also drawn according to the final length of the mounting rope if the panel is hung in this direction, eg purse seines and gill nets. If the N direction is at right angles to the mounting rope, eg for trawls and Danish seines, the N dimensions are drawn according to the fully stretched dimensions.

Any special hardware required for the net would normally be the subject of a separate technical drawing and only a simplified drawing showing how it is to be attached to the net need be shown on the net drawing.

For the benefit of the user of the net it is usual to show a schematic diagram of how to rig it, showing the length of connecting ropes, type and size of otterboards and groundrope if the net is a trawl, or the moorings if it is a static net, for example.

Space will be required on the drawing to list materials, tabulate equivalents for tapering rates, twine sizes and other information. The style of presentation and detailing of the drawing should be orderly and logical and, whereas artistic licence should be avoided, there is no reason why the draughtsman should not aim to produce a drawing the composition of which is aesthetically pleasing.

Detailing for Net Drawings

Net Sections

For each section of the net the drawing should show the material the netting is made of, eg nylon, polyethylene etc; the form of its construction, eg monofilament, twisted or braided (British Standard 4440: 1974 and 5172: 1975) and any special treatment required, eg bitumen-treated; the mesh and twine size; the final number of meshes in the N and T directions; taper rates; and dimensions.

Twine Size

The standard measure of twine size is its R tex number (British Standard 4406: 1969), which expresses the mass of 1,000 metres of the finished twine. For each net section the R tex number and mesh size in millimetres are shown to the right and left respectively within the area of the net section. For sections too narrow to enter these data side by side, they may be shown one above the other with the twine size uppermost. Some twine and net manufacturers still designate twine size by its runnage expressed either as yards per pound or metres per kilogramme. Equivalent runnages for the twine sizes to be used for the net may be tabulated separately.

Number of Meshes

The number of meshes in the T direction is normally shown close to and centrally inside the appropriate side. The number of rows (half meshes) in the N direction is usually shown against a dimension line together with the length in metres, the length depending on the way the net is hung. Dimensions in the T direction are not normally shown on drawings for trawls and Danish seines but they are shown for other nets.

Taper Rates

Taper rates are shown close to the outside of the taper. Either the bating/creasing rate or the cutting rates may be shown in this position. Both should be tabulated as equivalents elsewhere on the drawing sheet. All other information on the netting should be shown summarised in a "box" dealing with materials.

Ropes

For trawls and Danish seines the lengths of all the main ropes needed for the construction of the net — headline, fishing lines, wing lines and side lines — are usually printed on the drawing sheet below the drawing of the net, together with the recommended length of the groundrope if one is required. The type, size and construction of materials and any special treatment required for them are specified in the materials "box". Usually these items are not drawn in, their position in the net being understood. If it is considered necessary to indicate their position it is done with thicker lines drawn close to and parallel to those parts of the net to which they are to be attached.

Methods of Joining and Mounting the Netting

There are specific methods of joining net sections and netting to the ropes for different types of nets and usually no instructions for these operations are required on the drawing. If an alternative to the normal method for the type of gear is required, this should be stated on the drawing and reference made to the BSI standard classification (British Standard 5398: 1976); in addition an auxiliary sketch may be shown for clarification.

Other Information

It may seem obvious that the net should be given a name, but it is surprising how many net drawings are issued with a title that says very little by way of classification. The title should include type of net, and when appropriate the species it is intended to catch and the vessel horse power it is suitable for, eg Four Panel Midwater Otter Trawl, 1000 hp; Prawn Otter Trawl 300 hp; 30 fm Set Gill Net for Cod; Sandeel Otter Trawl 500 hp.

Ideally all the information required to construct the net should be shown on the drawing, but inevitably there will be occasions when a net maker may need to discuss some aspects of its construction with the originator. Other people may subsequently seek advice on its design. For this reason the originator's name and address should be given on the drawing.

A net design may subsequently be modified and a new drawing issued. The date of issue and a drawing number on all drawings will help to identify them.

Throughout the net manufacturing industry the choice of dimensions (stretched, hung) for net drawings tends to vary and it is therefore recommended that the dimensions used are stated on the drawing, ie horizontal dimensions per stretched or final length, vertical dimensions per stretched or final length, as applicable.

The information that should be given in detail on the drawing sheet is summarised in Table I and recommended symbols are shown in Figure 7.

TABLE I

Summary of Information required on a Net Drawing	(See Figures 9 and 10 for examples)
Net sections positioned relative to one another	Scaled line drawing
Scale of drawing	Statement
To which dimensions the net is drawn	"
The N direction of the netting	Symbol
Number of meshes in the T direction for each section and dimensions as appropriate	Print number of meshes centrally inside and close to top and bottom of each section and dimensions against dimension lines
Number of meshes or rows long and length in metres in the N direction for each section	Against dimension lines at either side of drawing sheet
Creasing/bating rates	Outside and close to tapered edge
Cutting rates	Tabulated against bating rates
Mesh size in mm	Within each net section and near to left side
Double-braided meshes	Symbol within net sections or suitably arrowed
Twine size — R tex number	Within each net section and near right side
Twine size - runnage	Tabulate against R tex numbers
Twine material, construction	Enter under materials
Headline	) Tabulate length below the drawing and
Groundrope	) enter details of sizes, materials and rope
Float line	) construction under materials
Lead line	)
Fishing lines	)
Wing lines	)
Side lines	)
Groundrope construction	Auxiliary drawing
Joining methods	State which methods, as necessary
Treatment of netting and ropes	State under 'Materials'
Rigging — connecting ropes, hardware, flotation, groundrope, weights etc	Auxiliary sketch with dimensions etc
Other items to be constructed	Detailed drawings and materials list as required
Title	Bold print
Originator	Name and Address
Date of issue	
Drawing number	

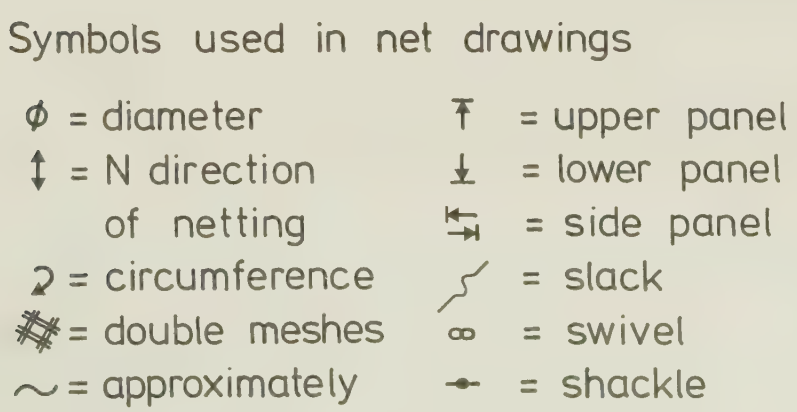


Figure 7. Symbols used in net drawings.

Preparation for the Drawing

Before executing the drawing, the design data must be studied and checked, the positions of any ncesessary datum lines for setting out the drawing determined, a suitable scale chosen and the general composition and layout of the main drawing, auxiliary drawings, tabulations and main captions determined.

It is recommended that a free-hand sketch of the net is made showing all the net sections and then all the given data entered on it. Then any data that the designer of the net has left for the draughtsman to calculate should be worked out and also entered on the sketch. The data should then be checked to see that the number of meshes across, rows long and bating rates are mathematically feasible and properly relate to the dimension of the net sections, and any discrepancies resolved before executing the final drawing. The next step is to consider what datum lines will be required from which to set out the drawing on the final drawing sheet. These will depend on the type of net and the complexity of its construction.

For all nets a vertical dimension line is shown on the drawing sheet. This is a convenient datum line from which all horizontal lines representing the widths of the net sections may be positioned according to the lengths entered against the net sections in the sketch. For single panel nets that are drawn according to the length of the headline, the horizontal dimension line may be used as a datum line from which all vertical lines representing the depth of each section may be positioned. The widths of tapered panels must be measured and marked from each side of a centre line.

The widest part of trawl panels is often that between the outside of the fore end of one wing and the outside of the other wing. If the area enclosed by these two points and the outside of the rear end of each wing is imagined as being one net section, then the fore breadth of the panel may be calculated from its lower breadth, the outside bating rate for the wings, the mesh size and the hanging ratio, in the same way that the breadth of the sections in the body of the net are calculated.

For more complex wings, eg the wing section shown in Figure 4, the horizontal limits of sub-sections may be calculated in the same way as the spread of the wings across their leading ends, except that, since both sides are equal, it is necessary to consider only half of the imagined section on one side of the centre line.

Executing the Net Drawing

The following explanation of the development of a drawing for a herring trawl is illustrated in Figures 8 and 9.

Net drawings are usually drawn on tracing paper to facilitate duplication. If tracing sheets with a standardised layout for references and information boxes are not available, then these will need to be drawn on blank tracing paper. Subsequently, it is suggested, one should proceed as follows:

Before drawing the net, lightly draw the vertical datum line near the left hand side of the paper and mark along it the depth of each net section; later the length and number of rows will be entered against this line for each section. Then lightly draw horizontal lines from these points across the paper. It may be necessary to work from a dimension line at the right side of the paper as a datum line for some sections of a lower panel.

Next mark off along the top line the horizontal extremities of each panel, leaving a little space between each panel. Using compasses and with the extremity points as centres scribe pairs of intersecting arcs to obtain the centre line of each panel. Still with the aid of compasses and using the

intersects of the centre lines with the horizontal lines, the top and bottom breadths of all the net sections may be marked on the horizontal lines. The outline of the net panels can then be closed by joining up the appropriate intersects.

The lower wings for this trawl have 1 metre slack, ie the length of netting in the lower wing is 1 metre longer than the combined lengths of netting in one top wing and square. When the top and lower panels are joined, the fore ends of the top and lower wings and the back of the square and fore part of the belly respectively, will be taken together and as joining the two panels proceeds, the 1 metre slack will be spread evenly throughout this part of the lestredge. Clearly the length of the lower wings cannot be drawn according to their fully stretched length if they are to be shown positioned correctly in relation to the top panel.

A dimension line for the rear section of the lower wings is required inside the main dimension line on the right side, from which to pro ect a faint line across where the bating rate on the outside changes from 1:3 to 1·2 and on which to mark off the width of the lower wings at this level equal to 40 meshes across. With the rear width of the wings marked off along the front edge of the belly equal to 15 + 35 meshes, the inside edge of the lower wings can be drawn and extended to the top horizontal line, ie the fore ends level with the fore ends of the top wings. The fore end width of the lower wings can now be marked off equal to 40 meshes wide and the outside of the lower wings closed with the convention for slack inco porated. With the lower wings now slightly foreshortened in the dr wing, the distance across their ends is a little less than the maximum width for the lower panel marked on the top horizontal line when the drawing was et out.

The fore width of the extension pieces in this example, ie of the sections of the top and lower panel that are 250 meshes across down to 120 meshes across, is narrower than the ends of the batings and belly, and the net appears stepped on the drawing. When the sections are joined, creasings will be made with the joining round every fourth mesh across the 200 meshes of the belly and batings and the selvedges will be smooth throughout. Some other nets when drawn may show much more marked stepping. Sometimes, but not often, a hind section is wider than the preceding section and the stepping is the other way round.

Where the bating rate for a section changes, the appropriate row is indicated on the drawing with a pecked line and the number of meshes in the row indicated close to it. Pecked lines are also used inside the area of net sections to indicate the boundaries of double mesh sub-sections.

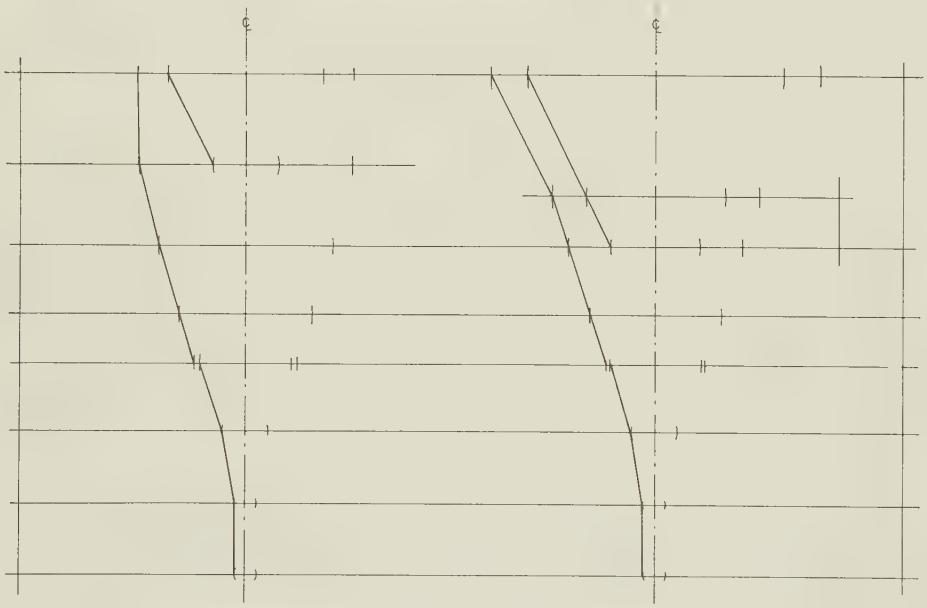
When the net has been drawn proceed next with auxiliary drawings to show, for example, non-standard methods of joining the netting to ropes, items that need to be specially constructed, diagrammatic elevation of the net and the components to which it is to be connected.

If the drawing is not required to be inked in with black ink the lines of the net panels and sections should be darkened.

When the drawing is complete, the dimensions and all the information relating to the items summarised in Table I should be neatly printed using recognised symbols and abbreviations (see Figure 7 for symbols).

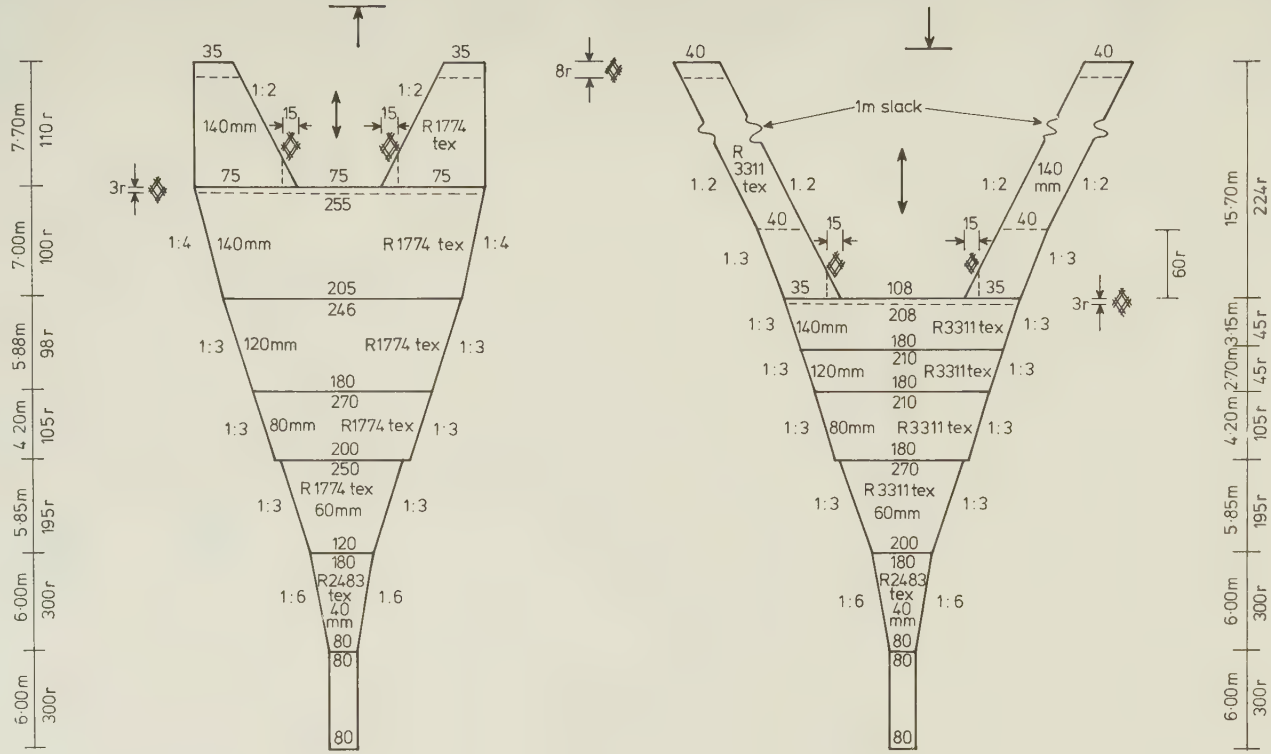
The design of some nets may call for a departure from some of the directives set out above and more sensible places may need to be chosen for entering some of the information. For example, the bulk of the netting of the small purse seine shown in Figure 10 is hung in the opposite direction from that

of most trawls, ie the N direction is across the net, whilst the borders of stronger netting of uniform width at the top and bottom of the net (the guarding) are joined with their T direction horizontal. For the main sections, bating rates are shown inside the net sections to avoid confusion with information on the guarding. It will be noted that the design of this net calls for the netting to be attached to the gables (side ropes) in a way that suggests a geometric progression, and the details are given at the side of the drawing.



DRAWN	MATERIALS	SCALE	MARINE LABORATORY TORRY ABERDEEN	DATE
CHECKED		DIMENSIONS		DRG. No.

Figure 8. First stages of drawing a two panel trawl.

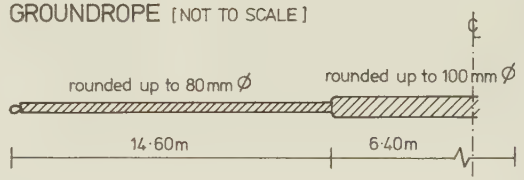


BATING RATE

1:2 = AB
1:3 = 1N4B
1:4 = 1N2B
1:6 = 1N1B

3 bosom meshes taken into one stapling at top & lower quarters

GROUNDROPE [NOT TO SCALE]



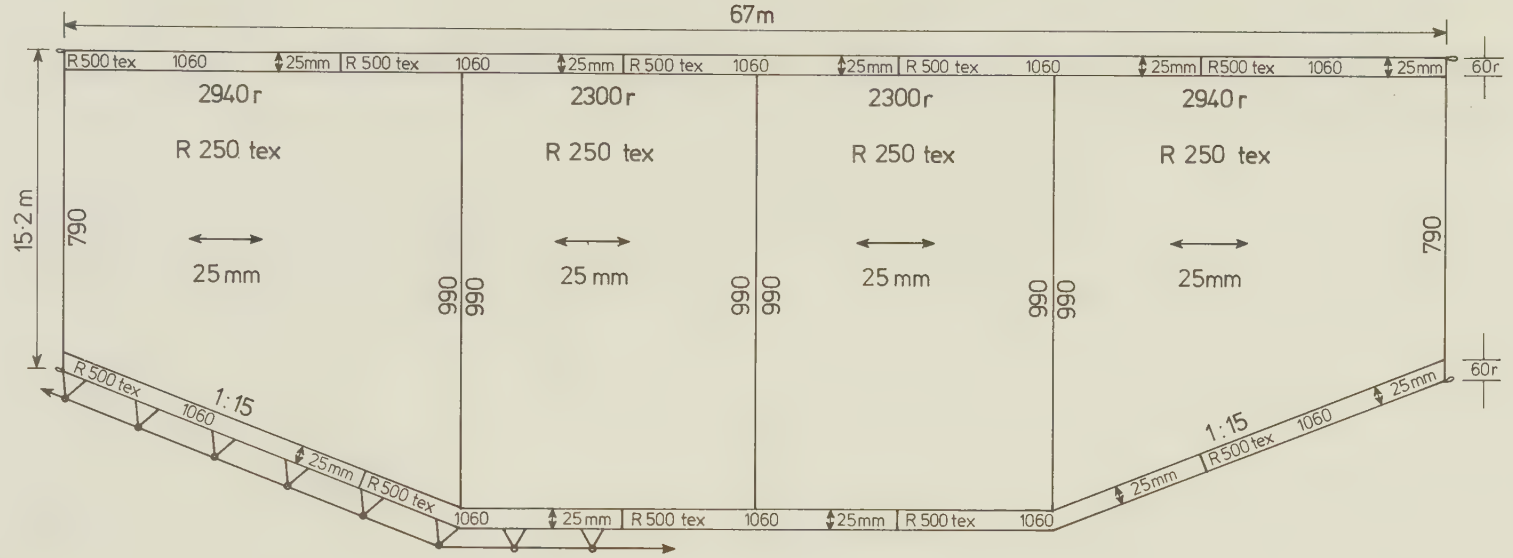
HEADLINE	20·65m [7·70 + 5·25 + 7·70] m
GROUNDROPE	35·60m [14·60 + 6·40 + 14·60] m
FISHING LINES	38m [15·25 + 7·50 + 15·25] m
WING LINES	3·50m [1·50 + 2·00] m

RIG [NOT TO SCALE]

DRAWN A.R.	MATERIALS		SCALE 1:200	MARINE LABORATORY TORRY ABERDEEN	DATE 20 11 76
CHECKED E.S.S.	NETTING – 3 STRAND TWISTED NYLON R 3311 tex 150 yd/lb UNTREATED R 2483 tex 200 " " R 1774 tex 290 " "	HEADLINE – PES. 30mm Ø BRAIDED GROUNDROPE WIRE – 20mm Ø 6/19s FISHING LINES – 22mm COMB. WING LINES – PES. 12mm Ø BRAIDED	DIMENSIONS BREADTH, HUNG LENGTH, FULLY STRETCHED	HERRING BOTTOM TRAWL 600 H.P.	DRG. No. 176

Figure 9. Completed drawing of a two panel trawl.

FLOTATION – 56 Purse Floats 150mm × 185mm ~I,M B/C



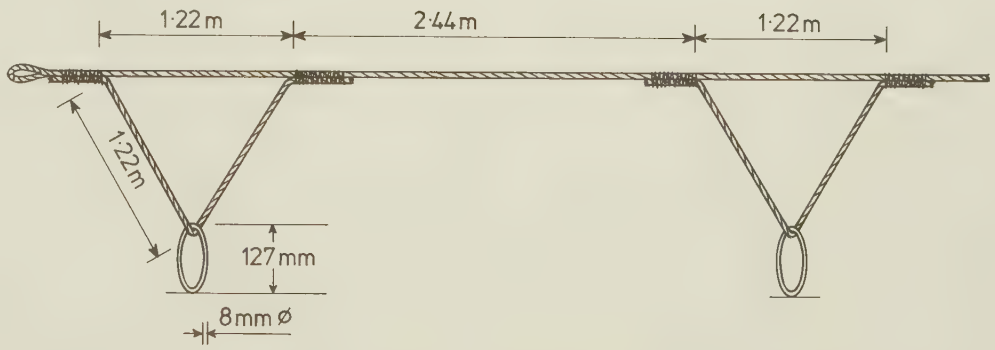
HANGING OF NETTING TO SIDE LINES

meshes	length of rope
	HEADLINE
85	1·90 m
85	1·77 m
85	1·69 m
85	1·61 m
85	1·56 m
85	1·49 m
85	1·41 m
85	1·33 m
85	1·26 m
85	1·18 m
	SOLEROPE

HEADLINE	67·0 m
SOLEROPE	70·1 m
GABLES	15·2 m
LEAD LINES	11×6·1 m + 23×1149 lead weights
	1×6·1 m + 47×1149 lead weights at wingend
PURSING ROPE	60 fm
PURSING ROPE STROPS	20×2·44 m

BATING RATE 1 : 15 = 13N : 4B

PURSING RING STROPS



DRAWN A.R.	MATERIALS NETTING – BITUMEN TREATED R 500 tex 1000 yd lb 3 STRAND TWISTED NYLON R 250 tex 2000 " " " " " " PURSING RINGS 20 × SST ROPES – UNTREATED HEADLINE 3 STRAND NYLON 14mm ø SOLEROPE " " " " " GABLES " " " " " LEADLINES " " SIS 12mm " PURSING ROPE – BRAIDED TERYLENE 14mm ø PURSING RING STROPS – 3 STRAND NYLON 12mm ø	SCALE 1:250	MARINE LABORATORY TORRY ABERDEEN	DATE 5 12 76
CHECKED E.S.S.		DIMENSIONS HEADLINE LENGTH SIDELINE LENGTH	SMALL PURSE SEINE FOR FRESHWATER COARSE FISH	DRG. No. 181

Figure 10. Small Purse Seine.

Summary The purpose of a net drawing is to communicate to net makers sufficient information to allow them to construct identical nets from the same drawing, and to users of the net the recommended way to rig it and restore it to its original specification should it be damaged during its working life. When executing the net drawing, therefore, the draughtsman should aim to produce a document that provides a complete specification for the construction of the net and any non-standard associated items. It should present all the information relating to shape, sizes, materials and construction, concisely and without ambiguity, using recognised conventions, symbols and nomenclature.

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